

## REMARKS

Applicants thank the Examiner for the Final Office Action of November 16, 2009. This Amendment is in full response thereto. Thus, Applicants respectfully request continued examination and allowance of the application.

Claims 15 and 17-27 are pending in this application.

### **Claim Rejections under 35 U.S.C. § 112:**

Claim 28 stands rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant has canceled the claim thereby mooting the rejection.

Claim 17 is rejected under 35, U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant has amended the claim to delete the word "long". As such, Applicant asserts that the metes and bounds of the claim are sufficiently clear to one of ordinary skill in the art and the rejection should be withdrawn.

### **Clarification of Applicant's Remarks in July 23, 2009 Amendment:**

In Applicant's July 23, 2009 Amendment, Applicant's representative declared:

*With respect to claims 16-18 and 23-24 in particular, in order to address the requirement of a macroporous layer and a microporous layer, the Examiner appears to rely upon the Goel disclosure (paragraph 62) of a non-porous dense upper layer and micro-porous lower layer. A non-porous dense upper layer is not the same thing as a macroporous layer. A macroporous layer requires porosity. A non-porous dense layer requires the absence of porosity. Also, one of ordinary skill in the art would recognize that micro-porous is not the same as macroporous.*

Applicant's Representative noted that the above remarks were not wholly accurate and now wishes to clarify. Applicant recognizes that dense or "non-porous" layers of gas separation membranes actually do have a very small degree of porosity (typically

on the order of magnitude of Angstroms) and that a “non-porous” layer does not have a complete absence of porosity. However, Applicant still asserts that one of ordinary skill in the art would not equate a non-porous dense layer with a macroporous layer.

**First Claim Rejection under 35 U.S.C. § 102:**

Claims 15-18 and 23-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Goel (PGPUB 2004/0115489). Claim 16 has been canceled, thereby mooting the rejection as to that claim. With respect to claims 15, 17-18 and 23-27, Applicant respectfully traverses because Goel fails to disclose, teach or suggest all of the limitations of the claimed subject matter.

Applicant has amended claim 15 to recite a device for transferring water and heat between a first air flow and a second air flow, comprising a stack of at least two transfer subassemblies having a lamellar configuration. Each of said transfer subassemblies comprises: a first structure comprising channels for distributing the first air flow; a second structure comprising channels for distributing the second air flow; one macroporous hydrophilic layer; and two microporous hydrophilic layers. The one macroporous hydrophilic layer is sandwiched between the two microporous hydrophilic layers to form a three-layer structure. The three-layer structure is sandwiched between the first and second structures.

To the extent that Goel addresses the above limitations, it discloses hollow fiber membranes packaged into a hollow fiber membrane module, tubular membranes packaged into a tubular membrane module, and flat-sheet membranes packaged into a plate-and-frame module (with reference to U.S. Patent No. 6,106,964 aka “Voss”).

Goel prefers the hollow fiber membrane module configuration. It is illustrated in FIG. 2 and the Examples describe its properties in detail. Thus, Goel prefers a configuration where a plurality of hollow fibers are potted in parallel fashion between two opposed headers. The cathode exhaust gas 25 enters nozzle 47 and into the space defined by inner surfaces of end cap 43 and an outer surface of header 42. The cathode exhaust gas then enters into the bores of the individual hollow fibers.

Moisture permeates from the bore to the exterior of the hollow fibers and into the space in between the two headers 42, 42'. Dry air 31 is introduced into this space via port 45 where it is humidified by the permeated moisture. The humidified air then exits port 46. The moisture-depleted cathode exhaust exits nozzle 48. From the foregoing, it is clear that the hollow fiber membrane module configuration is not a disclosure of a lammelar stack of at least two transfer subassemblies each one of which comprises a macroporous hydrophilic layer sandwiched between two microporous hydrophilic layers to form a three-layer structure sandwiched between first and second structures comprising channels for distributing first and second air flows.

Goel refers to the Vos patent (U.S. Patent No. 6,106,964) for the structural details of the less-preferred plate-and-frame configuration. While Vos teaches the possibility of a lamellar stack of plate-and-frame assemblies including a membrane 710 sandwiched between plates 720, 730, it does not teach a flat membrane comprising two microporous hydrophilic layers sandwiching a macroporous hydrophilic layer to form a three-layer structure sandwiched between the plates 720, 730. To the extent that Goel teaches multi-layer membranes, it discloses membranes having two layers (dense/non-porous and additional layer which may optionally be porous), either formed as a composite layer (two layers co-extruded together) or as an integral layer (the dense/non-porous layer formed by chemical treatment after extrusion).

Thus, the rejection should be withdrawn.

### **Second Claim Rejection under 35 U.S.C. § 102:**

Claims 15-17, 19, 21-24, and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Schmidt (USPAT 6,783,882). Applicant respectfully traverses because Schmidt fails to disclose, teach or suggest each of the claim limitations.

With respect to each of claims 15-17, 19, 21-24 and 27, in order to address the limitations of claim 15, the Examiner points to the filter assembly 112. Filter assembly 112 includes, in order, a filter cover 200, first gasket 204, first filter grill 212,

filter membrane 220, second filter grill 216, second gasket 208, and side panel 228. The Examiner considers filter cover 200 to be a first structure for distributing a first air flow and side panel 228 to be a second structure for distributing a second air flow. Applicant kindly points out that each of cover 200 and side panel 228 handle a single air flow because the air flow goes through each of the elements making up the filter assembly 112. Also, one of ordinary skill in the art would readily understand that cover 200 and side panel 228 do not **distribute** air flows with channels (as currently claimed). Additionally, Schmidt fails to disclose the three-layer structure recited by the current claims. Moreover, Applicant fails to see where Schmidt discloses that the membrane exists between a water reservoir containing the outflow exhaust gas and the inlet flow gas wherein the water reservoir and outflow exhaust gas humidify the inlet gas flow and the membrane exists between them (as posited by the Examiner). Rather, based upon FIGS 1-2 and Ins. 35-52 of col. 4 of Schmidt, one of ordinary skill in the art would recognize that the membrane described by the Examiner is disposed within filter 112 which is itself disposed in an opening in enclosure 104, so it is between an exterior and an interior of the Schmidt device. Finally, the Examiner does not address the required claim limitation of at least two transfer subassemblies having a lamellar configuration.

Thus, the rejection should be withdrawn.

**First Claim Rejection under 35 U.S.C. § 103:**

Claims 15-17, 19, 21, 23, 24, & 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hartnack et al. (PGPUB 2004/0234833) and Schmidt (USPAT 6,783,882). Applicant respectfully traverses because Schmidt fails to disclose, teach, or suggest all of the claim limitations as described in detail above, Hartnack fails to cure the deficiencies of Schmidt, and because Hartnack and Schmidt teach away from such a combination.

The combination of Hartnack and Schmidt suggested by the Examiner fails to disclose, teach, or suggest all of the claim limitations. As described above, Schmidt

fails to disclose, teach or suggest hydrophilic porous materials. Rather, the Schmidt membrane is explicitly disclosed as hydrophobic.

Hartnack and Schmidt teach away from the combination suggested by the Examiner. Schmidt teaches a membrane 220 in air filter assembly 112 that is made of a hydrophobic polymer. Hartnack's membrane 5 is made of a water-permeable material adapted to allow water to permeate from water space 31 to gas space 21. Hartnack's membrane is hydrophilic. One of ordinary skill in the art would not look to the field of air filters to find a substitutable membrane for substitution of a water-permeable membrane in a humidification cell. Additionally, such a one would not substitute a hydrophobic membrane for a water-permeable (and inherently hydrophilic) membrane when the goal of the water-permeable membrane is to permeate moisture.

Thus, the rejection should be withdrawn.

### **Second Claim Rejection under 35 U.S.C. § 103:**

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schmidt (USPAT 6,783,882) in view of claim 17 above, and Nuttall et al. (PGPUB 2005/0112430). Applicant respectfully traverses because Schmidt fails to disclose, teach, or suggest all of the claim limitations as described in detail above and Schmidt fails to cure the deficiencies of Schmidt.

### **CONCLUSION**

Accordingly, it is believed that the present application now stands in condition for allowance. Early notice to this effect is earnestly solicited. Should the examiner believe a telephone call would expedite the prosecution of the application, he/she is invited to call the undersigned attorney at the number listed below.

It is believed that no fee is due at this time. If that belief is incorrect, please debit deposit account number 01-1375. Also, the Commissioner is authorized to credit any overpayment to deposit account number 01-1375.

Respectfully submitted,

/Christopher J. Cronin/

Christopher J. Cronin  
Registration No. 46,513

Date: **January 19, 2010**

Air Liquide  
Intellectual Property Department  
2700 Post Oak Blvd., Suite 1800  
Houston, Texas 77056  
302-286-5525 Phone  
713-624-8950 Fax